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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/684,767	10/14/2003	Hiroshi Kushitani	MAT-8476US	3348
23122	7590	11/18/2004	EXAMINER	
RATNERPRESTIA P O BOX 980 VALLEY FORGE, PA 19482-0980			SUMMONS, BARBARA	
			ART UNIT	PAPER NUMBER
			2817	

DATE MAILED: 11/18/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/684,767

Applicant(s)

KUSHITANI ET AL.

Examiner

Barbara Summons

Art Unit

2817

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 October 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 10/14/03
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the switch wherein: (1) an "end of said strip line is ground via a capacitor", as recited in claims 2 and 7; (2) a reception filter is "configured by capacitive coupling"(?), as recited in claim 3; and (3) the reception filter "is a sharing device made by combining two SAW filters"(?), as recited in claims 5 and 10, must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. § 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 3-5 and 10 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 3 recites the limitation "a reception filter configured by capacitive coupling is provided..." which is totally unclear as to how the filter is "configured by capacitive coupling. Does the filter have stages coupled by capacitors? Is the filter simply an LC filter? Is the filter coupled to the reception port by a capacitor? The Examiner will assume the last question is true in any art rejections that follow.

Each of claims 5 and 10 recite that the reception filter is "a sharing device made by combining two SAW filters" which is unclear as to the structure provided by the two SAW filters. Is the reception filter a two-stage filter wherein two SAW filters are connected in series? Is the "sharing device" a branching filter with two different SAW filters operating at two different reception frequencies? The Examiner will assume the last question is true in any art rejections that follow.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1, 3, 6 and 8 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Furutani et al. U.S. 5,783,976 (an equivalent of JP 08-097743 cited by Applicants) in view of Hikita et al. U.S. 6,766,149.

Regarding claims 1 and 6, Fig. 1 of Furutani et al. discloses a high frequency switch 2 comprising: a first switch D1 that, although shown as a diode, is disclosed to also be a FET (see col. 2, lines 41-44 and col. 3, lines 32-33 and claim 4), is connected between an input/output port ANT and transmission port (i.e. the line V1 exiting the dashed box of switch 2); a strip line L2/L21 connected between the I/O port ANT and a reception port RX, and inherently having a length equal to $\frac{1}{4}$ wavelength at the transmission signal frequency in order for the device to function properly by blocking transmission signals from entering the reception port (see also col. 1, lines 44-46 and the identical switch of Fig. 11); a second FET switch D2 whose one end is connected to the strip line L2/L21 at a reception port side thereof, and whose other end is grounded through capacitor C5/C51 such that the strip line is connected between one end of the second FET switch and the I/O port; and a control port (see also the identical switch in

Art Unit: 2817

Fig. 11 and col. 1, lines 32-35, 50-53 and 56-60) for turning on and off the first and second FET switches; and wherein the strip line L2/L21 is formed in an inner layer being layer 22 (see Fig. 3) of a dielectric multilayer board, and the first and second FET switches are mounted on a surface of the multilayer board (see Fig. 2) as a high frequency device.

Regarding claims 3 and 8, a reception filter (not shown) must inherently be a part of the receiving circuit that is capacitively coupled via capacitor C3 to reception port, and a transmission filter F1 that is an LC filter is connected to an end of the transmission port (i.e. V1 exiting the left side of the dashed line box of switch 2) and is formed in an inner layer of the multilayer board.

However, Furutani et al. shows only a strip line L2/L21 and not a parallel unit of a strip line and a capacitor.

Hikita et al. is just one of many examples in the prior art disclosing that any circuit including lumped or distributed elements of capacitance and inductance that are equivalent to the $\frac{1}{4}$ wavelength line may be substituted therefor (see the similar line 37 in Fig. 5 and see col. 11, lines 40-43 and 55-56).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the switch of Furutani et al. by having substituted a parallel unit of a strip line and a capacitor in place of the strip line L2/L21, because such an obvious modification would have been merely the substitution of art recognized equivalent circuits for $\frac{1}{4}$ wavelength lines as suggested by Hikita (ibid.).

6. Claims 4, 5, 9 and 10 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Furutani et al. U.S. 5,783,976 in view of Hikita et al. U.S. 6,766,149 as applied to claims 1 and 6 above, and further in view of Tanaka et al. U.S. 6,060,960

The Furutani/Hikita combination discloses the invention as discussed above except for disclosing the reception filter being a surface acoustic wave (SAW) filter or a sharing device with two SAW filters, and being mounted on the multilayer board.

Tanaka et al. has common inventors with Furutani et al. and discloses (Fig. 1) almost the identical structure of the switch and filter F1. Additionally, Tanaka et al. further shows mounting a SAW reception filter F2 on the multilayer board (see Fig. 3 and col. 3, line 61 to col. 4, line 4) to miniaturize the duplexer by further integrating the SAW reception filter into the composite device. Furthermore, Tanaka et al. discloses having two SAW reception filters (see Fig. 4).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the switch of the Furutani/Hikita combination by having provided a SAW reception filter or two SAW reception filters on the multilayer board such as taught, for example, by Tanaka et al., because such an obvious modification would have provided the advantageous benefits of a duplexer of reduced size by integrating the SAW filters into the composite switch device and reduced costs as suggested by Tanaka et al. (see col. 3, line 61 to col. 4, line 4), and wherein the number of SAW filters provided would have been an obvious modification based on the intended use of the device as suggested by Tanaka (see Fig. 4 and col. 4, lines 19-30).

Art Unit: 2817

7. Claims 2 and 7 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Furutani et al. U.S. 5,783,976 in view of Hikita et al. U.S. 6,766,149 as applied to claims 1 and 6 above, and further in view of Morikawa et al. U.S. 5,499,000.

The Furutani/Hikita combination discloses the invention as discussed above, except for disclosing one end of the strip line grounded by a capacitor formed in the multilayer board.

Morikawa et al. discloses a similar switch (see Fig. 4) that adds a capacitor 42 that is formed within the multilayer board (see Fig. 3 and col. 7, lines 4-6) to improve impedance matching and thereby reduce reflection and insertion loss at receiving (see col. 3, lines 2-9).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the switch of the Furutani/Hikita combination by having added a grounding capacitor to one end of the strip line and hence the parallel unit of strip line and capacitor, because such an obvious modification would have provided the advantageous benefits of improved impedance matching, adjustability, and reduced reflection and reduced insertion loss at reception as suggested by Morikawa et al. (ibid. and col. 7, lines 4-6).

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Yoshihara et al. U.S. 4,677,688 shows a high frequency antenna switch (Fig. 2) with a parallel resonant LC circuit 25 and 23 in the receiver branch (col. 2, lines 32-34).

Art Unit: 2817

Kitakubo et al. U.S. 5,634,200 provides further evidence that a high frequency antenna switch can be formed with either a diode or a FET as art recognized equivalent semiconductor switches (see Fig. 12 vs. Fig. 13).

Sakuragawa et al. U.S. 6,472,953 also provides evidence of the art recognized equivalence of diode and FET switches and clearly shows how the connections correspond (see Fig. 21).

Ishizaki et al. U.S. 6,456,172 and Tanaka et al. U.S. 6,563,396 each disclose a composite component including a switch, a filter in a multilayer board and a SAW filter mounted on the board.

Atokawa U.S. 6,483,399 discloses an antenna branching circuit with a switch that provides two SAW filters in the receiving branch.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Barbara Summons whose telephone number is (571) 272-1771. The examiner can normally be reached on M-Th, M-Fr.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bob Pascal can be reached on (571) 271-1769. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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November 12, 2004



**BARBARA SUMMONS
PRIMARY EXAMINER**